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## **The Factor Structure and Composite Reliability of the Rosenberg Self-Esteem Scale among Ex-Prisoners**

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**Version accepted for publication**

### **Abstract**

The aim of this study was to examine the factor structure and composite reliability of the Rosenberg Self-Esteem Scale (RSES) using a sample of 669 ex-prisoners identified in the National Survey of American Life. Six distinct factor models, with uncorrelated measurement error terms, were specified and tested using confirmatory factor analysis (CFA). Results indicated that the two-factor model consisting of positive and negative latent variables provided a better fit to the data than the alternative models. Moreover, only positive self-esteem was a significant predictor of recidivism. Composite reliability indicated that the two factors were measured with very good reliability. The results consequently provide additional support for a two-dimensional model of the RSES within offender populations.

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## **Introduction**

Self-esteem has received considerable empirical attention within the criminal psychological literature as a predictor of various types of offending behaviour. Low levels of self-esteem have been found to be related to a range of violent offending behaviour including interpersonal attacks (Sutherland & Shepherd, 2002), sexual assaults (Shine, McCloskey, & Newton, 2002), and partner-violence in both males (Sharpe & Taylor, 1999) and females (Lewis, Travea, & Fremouw, 2002). Other research, however, has suggested that higher levels of self-esteem are associated with violent offending behaviour (e.g., Baumeister, Smart, & Boden, 1996; Kernis, Grannemann & Barclay, 1989). Although inconsistencies exist within the criminal psychological literature about the precise nature of the relationship between self-esteem and criminal behaviour, the empirical evidence does support the utility of studying self-esteem as a predictor of criminality.

The Rosenberg Self-esteem Scale (RSES; Rosenberg, 1989) is one of the most widely used measures in self-esteem research. Rosenberg initially conceptualised self-esteem as an aspect of one's self-concept which reflects positive and negative evaluations of the self (Rosenberg, 1965). The RSES was designed to measure self-esteem as single construct. However, research findings are inconsistent with respect to the appropriate number of latent factors necessary to explain the underlying factor structure of the measure. Shevlin, Bunting, and Lewis (1995), using confirmatory factor analytic (CFA) procedures, found support for the accuracy of a one-factor solution. Other research findings have suggested a range of multi-factorial solutions (see Huang & Dong, 2012 for a review), including a large body of research that has indicated that the RSES is more appropriately conceptualized as a two-factor solution represented by positive and negative aspects of self-esteem (Bachman &

O'Malley, 1986; Carmines & Zeller, 1979; Dobson, Goudy, Keith, & Powers, 1979; Kaufmann, Rasinski, Lee, & West, 1991).

In an attempt to reconcile these contrary findings, Marsh (1996) tested six alternative structural models, including a series of correlated uniqueness models, and found evidence that the RSES could be accurately represented by a single common factor and a method factor primarily composed of the negatively phrased indicators. Subsequently, Tomas and Oliver (1999) investigated nine alternative models using CFA procedures. These structural models included the traditional one- and two-factor solutions along with a series of non-traditional model conceptualizations, including method effects and correlated errors terms. The results of their analysis were in line with those of Marsh's (1996) findings of a single common factor and a method factor mainly comprised of the negatively worded items. However, Marsh analyzed a 7-item scale, instead of the full 10-item scale, and Thomas and Oliver used the Spanish version of the RSES. Consequently, Marsh's results may not apply to the full RSES, and Thomas and Oliver's results may not generalize to studies conducted in the United States due to cultural differences – individualism versus collectivism – which may impact on self-concept and attitudes towards the self (Diener & Diener, 1995; Markus & Kitayama, 1991). Dunbar, Ford, Hunt, and Der (2000) reported that a one-factor solution with correlated errors for the negatively worded items was a better fit than a two-factor solution. The results of this study can be criticised, however, due to the authors' reliance on the use of correlating errors. Brown (2006) has argued that item errors should never be correlated to improve model fit as such procedures imply the presence of an additional unspecified latent construct. Additionally, correlation of item errors can lead to difficulties in interpretation and replication.

Despite the frequency with which self-esteem is measured among prisoner and offender samples, to date only one study has examined the factor structure of the RSES among this population. Boduszek, Shevlin, Mallett, Hyland and O’Kane (2012) compared the one- and two-factor solutions of the RSES among a sample of 312 recidivistic, male Polish prisoners. CFA methods with uncorrelated item errors were employed and the results indicated that the two-factor solution, representing the positive and negative components of self-esteem, was an adequate fit of the data, and far superior to the one-factor conceptualization. This study constituted the first empirical evidence that, among offender populations, self-esteem is best conceptualized as two distinct constructs. These results offer a possible explanation for the inconsistencies in the criminal psychological literature with regards to the relationship of self-esteem to criminal offending. Moreover, Boduszek, Adamson, Shevlin, Mallett and Hyland (2013) demonstrated the differential impact of the two factors (positive and negative) of self-esteem in a later study on criminal cognitions. The negative but not positive component of self-esteem was found to be a significant predictor of the cognitive centrality aspect of criminal social identity. This suggests that these factors measure substantially different underlying constructs, and that self-esteem might not be considered unifactorial among offender populations.

Given the inconsistencies in the literature concerning the appropriate factor structure of the RSES, and the paucity of such research among offender populations, the current study aims to replicate and extend the study of Boduszek et al. (2012) by investigating the underlying factor structure of the RSES among a large sample of male and female ex-prisoners from the United States of America. To achieve this, a series of six competing models of the RSES, using uncorrelated measurement error terms, were specified and tested.

## **Methods**

### **Participants**

The sample consisted of 669 ex-prisoners (68.5%,  $n = 458$  male) identified in the National Survey of American Life (for more information on the survey see Jackson et al., 2004). The participants ranged in age from 18 to 84 years ( $M = 41.06$ ,  $SD = 14.01$ ). Most ex-prisoners (90.4%;  $n = 605$ ) were born in the United States and the majority (86.5%;  $n = 579$ ) were Black or African American. At the time of data collection, 64.3% ( $n = 430$ ) of respondents were currently employed, 15.1% ( $n = 101$ ) unemployed, and 20.6% ( $n = 138$ ) not in the labour force. In addition, 38.0% ( $n = 254$ ) of respondents indicated their marital status as married or cohabiting, 30.8% ( $n = 206$ ) as divorced, separated or widowed, and 31.2% ( $n = 209$ ) as never married. The frequency of imprisonment reported ranged from 1 to 20 times ( $M = 2.17$ ;  $SD = 2.62$ ).

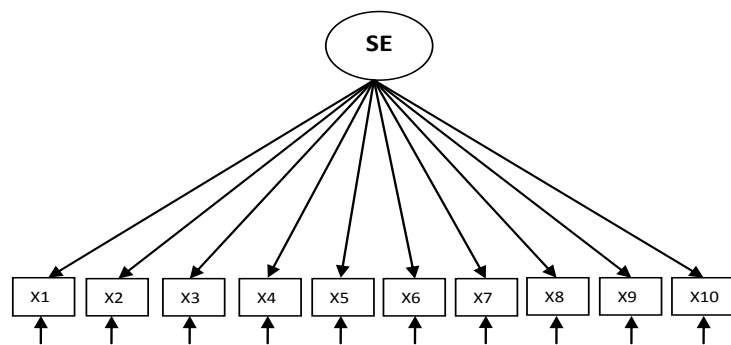
### **Measure**

The Rosenberg Self-esteem Scale (Rosenberg, 1989) consists of ten items scaled on a four-point response structure (1 = strongly disagree to 4 = strongly agree). Scores can range from 10 to 40, with higher scores reflecting more positive evaluations of the self (Rosenberg 1965). Five items are positively worded and five items negatively worded, in an attempt to inhibit response bias, that is, an individual's tendency to agree with statements regardless of their content.

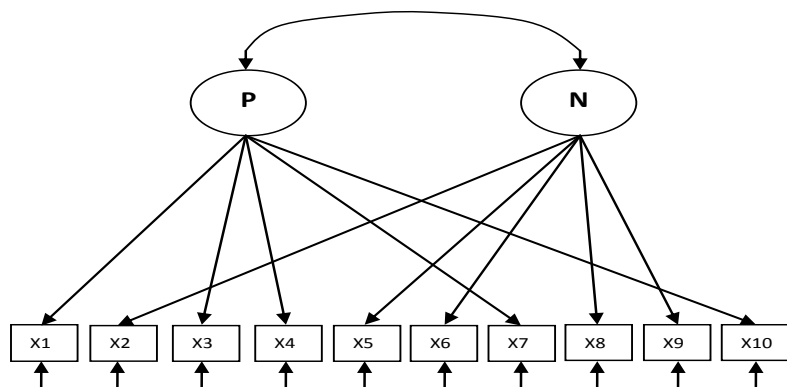
### **Analysis**

The dimensionality of the RSES was investigated through the use of conventional confirmatory factor analytic (CFA) techniques, along with the utilization of a confirmatory bifactor modelling approach (see Reise, et al., 2007). The following six models were specified and estimated using Mplus version 6.12 (Muthen & Muthen, 1998 – 2010) with

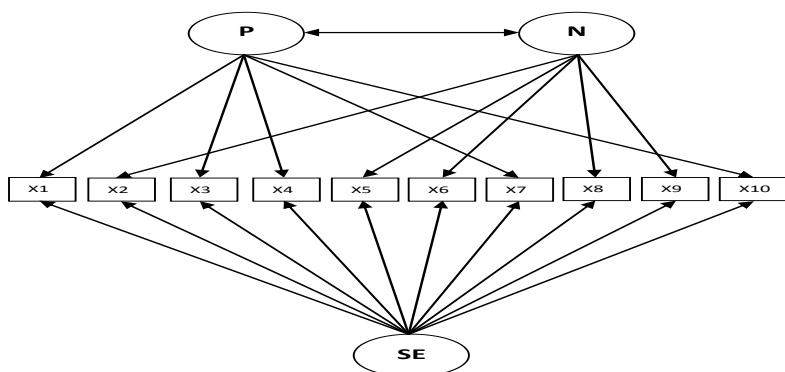
robust maximum likelihood (MLR) estimation: (a) Model 1, a 10-item unidimensional model; (b) Model 2, 10 items and two correlated factors (positively and negatively orientated items); (c) Model 3, 10 items and two independent factors (positively and negatively orientated items); (d) Model 4, one global self-esteem factor and two correlated method factors that includes the positive items on the one hand and the negative items on the other; (e) Model 5, one global self-esteem factor and one method factor that includes the positive items; (f) Model 6, one global self-esteem factor and one method factor that includes the negative items (see figure 1)



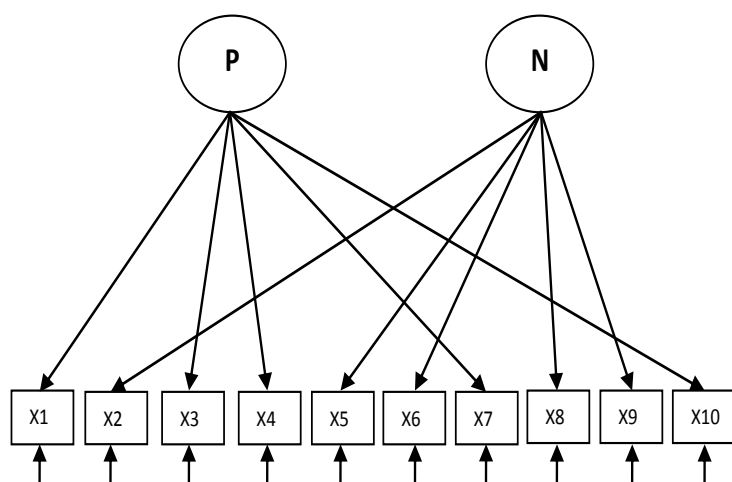
**Model 1**



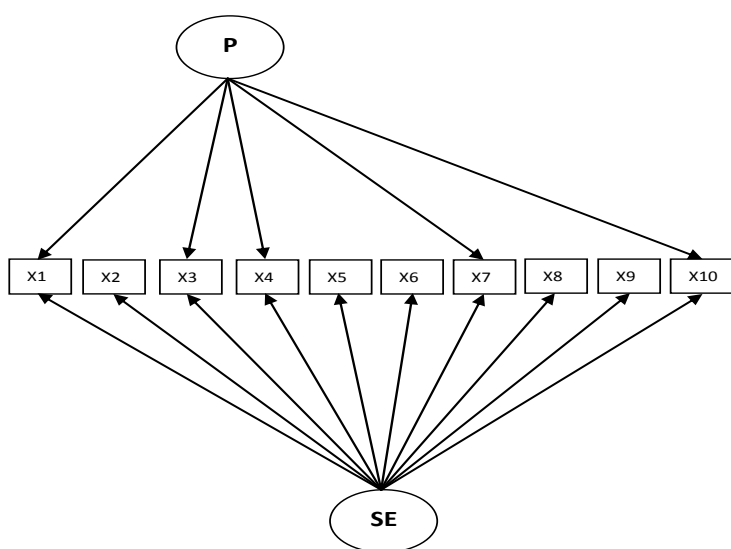
**Model 2**



**Model 4**

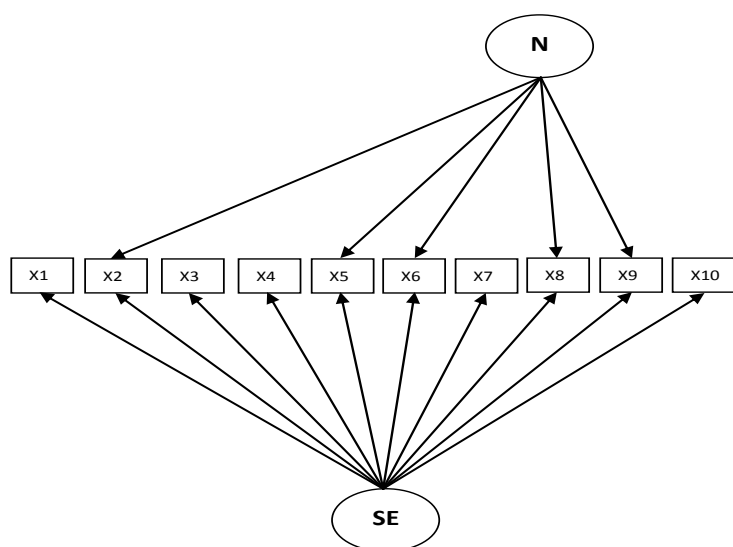


**Model 3**



**Model 5**





**Model 6**

Figure 1 Alternative Factor Models of Rosenberg Self-Esteem Scale

Note: P = Positive Self-Esteem; N = Negative Self-Esteem; SE = Global Self Esteem

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters.

The chi-square ( $\chi^2$ ) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected.

Therefore, Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate reasonable fit while values above .95 indicated good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are

presented; the standardized root mean-square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model.

The specified models in this research allowed items to load only onto a single factor, with uncorrelated measurement error terms as suggested in previous research (Boduszek et al., 2012; Brown, 2006).

## Results

Means and standard deviations for self-esteem, recidivism and total number of years served in prison are presented in Table 1.

Table 1  
Descriptive Statistics

Variable	M	SD
Self-Esteem total	34.98	4.83
Self-esteem positive	18.40	2.01
Self-esteem negative	16.58	3.54
Recidivism (number of times served in prison)	2.17	2.62
Total amount of time in prison (in years)	1.6	3.85

Table 2 reports both absolute and comparative fit indices for each model. As shown in Table 2, all indices show improvement in the two-factor model (Model 2). Although the chi-square is large in relation to the degree of freedom, and statistically significant, Tanaka (1987) suggests that the model should not be rejected on this basis, since large sample sizes amplify the power of the test. Additionally, the CFI = .91, TLI = .89, RMSEA = .06 and RMSR = .05 indicate an adequate fit of data. The AIC also shows that the two-factor model is a more parsimonious model compared to the alternative models.

Table 2 Fit indices for the alternative CFA models of Rosenberg self-esteem scale.

Item	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
$\chi^2$	224.66	122.56	255.14	284.49	205.61	174.19
df	35	34	35	27	30	30
p	.00	.00	.00	.00	.00	.00
RMSEA	.09	.06	.10	.12	.09	.09
90% CI	.08 .10	.05 .08	.09 .11	.11 .13	.08 .11	.07 .10
SRMR	.07	.05	.16	.35	.06	.06
AIC	13606.91	13450.22	13623.21	13704.37	13568.66	13541.02
CFI	.81	.91	.78	.75	.83	.86
TLI	.76	.89	.72	.57	.74	.77

Note. RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval; SRMR = Standardized Root Mean Square Residual; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index.

The adequacy of this model can also be determined in relation to its parameter estimates. As can be seen in Table 3 all items displayed statistically significant ( $p < .001$ ) factor loadings on their respective factors. Factor loadings were all in the expected direction and all items

displayed factor loadings above .4 with the exception of item 4 ( $\beta = .38$ ). The correlation between the two factors was  $r = .56$ .

Table 3

Unstandardized and standardized factor loadings (and standard errors) for two-factor model of self-esteem.

Item	B	$\beta$	SE
<b>SELF-ESTEEM</b>			
<b>Factor 1 (Positive Self-Esteem)</b>			
1. On the whole, I am satisfied with myself.	1.00	.56	.06
3. I feel that I have a number of good qualities.	.60	.55	.06
4. I am able to do things as well as most other people.	.75	.38	.06
7. I feel that I'm a person of worth, at least on an equal plane with others.	1.27	.67	.05
10. I take a positive attitude toward myself.	1.45	.61	.05
<b>Factor 2 (Negative Self-Esteem)</b>			
2. At times, I think I am no good at all.	1.00	.59	.04
5. I feel I do not have much to be proud of.	1.41	.63	.04
6. I certainly feel useless at times.	1.44	.50	.04
8. I wish I could have more respect for myself.	1.92	.73	.03
9. All in all, I am inclined to feel that I am a failure.	1.72	.76	.03

Note. All Factor loadings are statistically significant ( $p < .001$ ).

Further analysis suggested that only positive self-esteem factor was statistically associated with level of recidivism ( $\beta = .11$ ;  $p < .05$ ) while controlling for time spend in prison ( $\beta = .23$ ;  $p < .05$ ).

As most researchers rely on internal consistency of items (Cronbach's  $\alpha$ ; Cronbach, 1951), the current study evaluated the internal reliability of the measurement properties of the scale

by assessing the composite reliabilities. Composite reliability was calculated using the formula

$$\rho_c = \frac{\left( \sum_{i=1}^m \lambda_i \right)^2}{\left( \sum_{i=1}^m \lambda_i \right)^2 + \left( \sum_{i=1}^m (\theta_i) \right)}$$

where  $\rho_c$  = reliability of the factor score,  $\lambda_i$  = standardized factor loading, and  $\theta_i$  = standard error variance. Values greater than .60 are generally considered acceptable (Bagozzi & Yi, 1988; Diamantopoulos & Siguaw, 2000). The results show that all factor scores are measured with very good reliability (positive self-esteem,  $\rho_c = .96$ ; negative self-esteem,  $\rho_c = .98$ ; total self-esteem,  $\rho_c = .99$  compared to Cronbach's  $\alpha = .79$ ).

## Discussion

The aim of this study was to examine the factor structure of the RSES in a sample of ex-prisoners. Six competing models were specified and tested in this research and items were allowed to load only onto a single factor, with uncorrelated measurement error terms. On the basis of the fit indices, the two-factor solution, comprising of correlated positive and negative self-esteem latent variables, was considered to be an adequately fitting model, and to provide a better fit to the data than the alternative solutions. This finding supports earlier research by Boduszek et al., (2012) which found that the RSES was a two-dimensional construct within a sample of Polish recidivistic prisoners. The differential relationship between the positive and negative self-esteem factors and recidivism provides additional support for the two-factor solution. As suggested by Carmines and Zeller (1979), if the positive and negative self-

esteem factors measure substantially different dimensions, they should differentially relate to external variables. Although when Carmines and Zeller tested this in their sample, the two self-esteem factors did not differentially relate to 16 external variables, in the present research, only positive self-esteem was significantly related to recidivism. Consequently, there is empirical support for the suggestion that the RSES may be best specified as assessing two distinct, yet related constructs within offender samples. The positive and negative RSES subscales also showed good reliability, as assessed using composite reliability – a more appropriate method for assessing scale reliability than Cronbach's alpha, given the nature of the analytical approach (CFA) (Novick & Lewis, 1967; Raykow, 1998).

The results indicate that negative and positive self-esteem are not bi-polar constructs. A low negative self-esteem score is not necessarily indicative of a high score on positive self-esteem. This underscores the importance of considering both positive and negative aspects of self-esteem when employing the RSES within the offender sample (Boduszek et al., 2012).

The results of the present study should be interpreted in light of several important limitations, some of which point towards important directions for future research. First, the sample of ex-prisoners was relatively homogenous, thereby limiting the generalizability of the results to more diverse samples of varying ages, ethnicities, and offender groups. Replication of these results with more heterogeneous samples is, therefore, needed. Second, the use of self-report data also introduces several well-known limitations, such as response bias.

In conclusion, the RSES was found to assess two distinct constructs (positive and negative self-esteem) and not the one-dimensional construct of global self-esteem that was originally conceptualized by Rosenberg (1965) and supported by some researchers by the inclusion of correlated error variances. This suggests that researchers may need to re-evaluate their use of the RSES and its theoretical underpinnings when applying the scale to offender

samples. The current results provide further empirical support to previous prison study findings of the two-factor solution to the RSES, as a consequence of the incorporation of key methodological strengths from earlier research by Boduszek et al. (2012) and the uniqueness of the sample in which the factorial structure and reliability was tested.

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